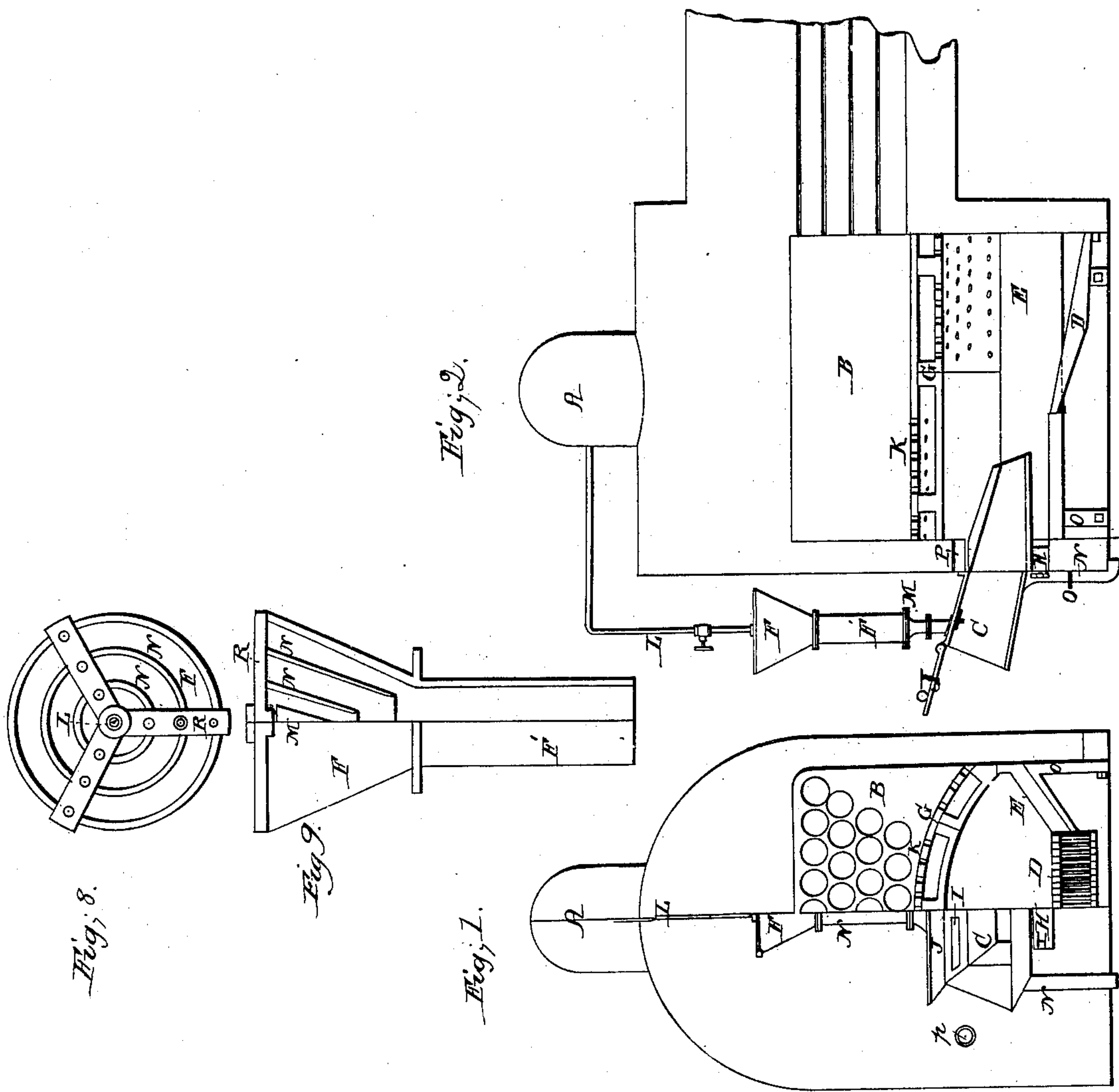


J. T. Rich,

Steam-Boiler Furnace,

No 82,249.

Patented Sep. 15, 1868.



Witnesses;

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United States Patent Office.

JOHN T. RICH, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 82,249, dated September 15, 1868; antedated July 8, 1868.

IMPROVEMENT IN GAS-BURNING FURNACE FOR STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOHN T. RICH, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Furnaces for Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a front elevation, partly in section.

Figure 2 is a side elevation, partly in section.

Figure 8 is a plan of the steam-blower.

Figure 9 is an elevation, partly in section, of the same.

The same letters are employed in all the figures when indicating the same parts.

This invention relates to the construction of furnaces for steam-generators. In the application now made, I set forth particularly a furnace designed for burning coal. Modifications of the plan adapted for burning petroleum, as a fuel, are shown in the drawings, but are not especially claimed herein, but will be made the subject of another application.

My invention consists in subjecting the fuel, before it enters the fire-box, to a distillation, under heat generated in the fire-box, and the combustion of the gases thus evolved, on entering the fire-box, mixed with steam and air, and the subsequent introduction of the residuum into the fire-box, to be burned in the ordinary manner on the grate-bars.

It also consists in the peculiar arrangement of the furnace, to be hereinafter specifically set forth and designated in the claims.

In the annexed drawings, A is an ordinary tubular boiler, for generating steam, and B is the fire-box. C is a chute, through which the fuel is introduced. It is closed in front by a door, J, and extends forward into the furnace in the form of a tube projecting into the fire-box; that portion of it which is within the fire-box being nearly horizontal, the exterior portion being inclined, as shown in fig. 2.

The grate-bars are shown at D, below which is the ash-pit, the grate-bars being so placed that the coke falling from the tubular chute C will drop upon them.

Doors, H, placed immediately below the chute, are used for cleaning away cinders and clearing the fire.

Arches or diaphragms of fire-brick, with perforations, K, are extended across the fire-box, dividing it entirely, the arches extending from wall to wall. The perforations are extended over the entire area of the arches, at close intervals, to permit the gases in rising to pass freely, and insure their thorough distribution and combustion.

Combustion may be conducted with either a natural or an artificial draught. In the latter case, I carry steam from the dome through a pipe, L, and discharge it in a jet through the blower F. The latter is formed by a series of concentric conical funnels, N, into the centre of which the orifice M of the steam-pipe L discharges the steam. These funnels discharge the air or steam passing through them into a pipe, F', formed by an extension of the external case F. These concentric funnels are so arranged that each outer one shall be longer than the next inner one, by which the air and steam entering through the inner one are caused to diverge more and more as they encounter the current entering through the outer spaces, filling and packing the air in the pipe F', through which it is forced by the jet into the chute C. This pipe may be closed, more or less, by a damper at M'. A pipe, N², is extended from the blower around both sides of the chute, and continued into the fire-chamber below the grate-bars, to supply the draught required for the combustion of the coke in the grates.

I prefer to construct the arch double, leaving a space between the arches, into which space air may be introduced at P. The double arches are especially necessary when very rich coals are used.

This furnace, constructed as described, is operated as follows:

The coal is introduced into the chute C, and falls upon the horizontal tubular pipe extending into the fire-box, where it is allowed to remain, the door J being tightly closed. Being exposed to the heat of the coke upon the grate-bars, and also to the heat reflected from the fire-brick arches, the coal in the tube, which acts as a

retort, will be subjected to distillation, and the gases evolved will enter the fire-box, and become ignited, mingling with the air and vapor of wet steam entering through the blast.

As the gases are extracted from the fuel in the tubular chute, the residuum of coke will be pushed, by the introduction of fresh coal, from the pipe, and fall upon the grate-bars, where it will be burned in the ordinary manner. The arches, being heated to a very high temperature, will communicate to the gases, passing through them and the intermediate space, a high temperature, which will insure their perfect combustion before entering the up-take.

In commencing the operation, the furnace must be first heated by kindling a wood fire on the grate-bars, and maintaining it until the arches become hot enough to cause the distillation of the coal.

I have found by experiment that it is necessary, to the best action of the furnace, that the blast entering through the pipe F' should be discharged from above into the top of the chute, thereby preventing the too rapid distillation of the coal.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. So arranging a furnace that the coal shall be subjected to distillation before it enters the fire-box, and at the same time so arranging the draught or blast that the gases thus evolved shall be thoroughly mingled with atmospheric air, or air and steam within the furnace, but before entering the fire-box or combustion-chamber to be consumed, substantially as described.

2. The chute C, extending, in the form of a tube, into the fire-chamber, and serving as a retort, for the purpose of distilling the coal retained in the tube, by means of the heat of the fire-box, in combination with a draught-pipe, F F', substantially as set forth.

3. The steam-blast F, so arranged, in relation to the tube or retort in which the coal is subjected to distillation, that the wet steam and atmospheric air shall be mingled with the gaseous products of the coal before entering the fire-box, substantially as set forth.

4. The arches or diaphragms G, when constructed of a refractory substance, and extended entirely across the fire-box, and perforated with openings K, substantially as and for the purpose set forth.

5. Double perforated arches or diaphragms G, in combination with intermediate openings, P, through the external walls.

6. The combination of the chute C, extending into the fire-box, to act as a retort in the distillation of the coals, and arches or diaphragms G, so located within the fire-box as to reflect the heat upon such retort, substantially as set forth.

7. The steam-blower, constructed with concentric funnels, N, extending successively from the centre, one beyond the other, and discharging the currents passing between them into a tubular extension, F', of the outer case F, substantially as set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. RICH.

Witnesses:

R. MASON,

JNO. KENNEY.